Pb Zn

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Task Force Meets and Prepares Draft Document on Lead in Soil Guidelines

A phased action plan for decision making and a blood lead standard or action matrix formula which allows for a variety of environmental situations and regulatory criteria has been developed for lead in soil by the Society of Environmental Geochemistry and Health's (SEGH) Task Force on Lead in Soil.

A first meeting of the Task Force was held on December 8-10, 1988 in Cincinnati, Ohio to develop an outline for a draft report on Lead in Soil Guidelines. Three working groups were formed by the Chairman of the Task Force, Bobby Wixson, Ph.D., of Clemson University.

I. Environmental
II. Health
III. Policy/Management

Each group developed a draft summary based on the current literature, the papers presented at the North Carolina 1988 Lead in Soil Conference and the Phased Action Plan developed at the 1988 Conference and these summaries were then discussed in depth at a second Task Force meeting on May 27-29 in Cincinnati, Ohio.

At both Task Force Meetings, there was extensive discussion of the possibility of using a single number for a lead in soil standard to protect the population at risk. The single number concept was considered unrealistic by the Task Force for a number of reasons. First, there are various levels of blood lead concentrations used as standards throughout the world and these levels are changing as different criteria and effects of lead are considered. Second, the environment of the populations at risk can vary widely i.e., industrial sites, residential sites, old mining areas, or waste disposal sites. Third, the population at risk can vary i.e., young children, the elderly, or vacant land proposed for development.

Based on these considerations, the Task Force developed a soil lead matrix model to allow for a variety of environmental situations and regulatory criteria. In the model, blood lead concentration is equated to a baseline level plus an increment due to soil or dust lead. The blood lead concentration is derived from the blood lead standard or target concentration used and the degree of protection required in the population. The baseline level takes into account exposure from all other sources - air, paint, or water, must be added to 'natural' uncontaminated levels. The slope of the blood lead-soil relationship can thus vary depending on a variety of factors, and this response can be adjusted for a given situation and modified as more data become available.

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Reproductive and Developmental Study Continues Despite Chinese Political Unrest

ILZRO granted funds in 1990 to Robert Bornschein, Ph.D., of the University of Cincinnati to carry out a project with Dr. Bojian Wan of the China Medical University in Shenyang on Reproductive and Developmental Effects of Occupational Lead Exposure Among Women in Shenyang, China.

Dr. Bornschein plans to recruit 160 pregnant women from a battery manufacturing plant and two printing plants in Shenyang, China. Blood samples and urine samples will be collected at enrollment and during the pregnancy, and cord blood lead samples will be obtained at delivery. Pregnancy outcome data will be obtained on: birth weight, birth length,

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ISSUES AND GUIDELINES (cont.)

The model proposed by the Task Force is as follows:

FIGURE 1 - *Derivation of a lead in soil model using blood lead concentrations*

$$S = \frac{\left[\frac{T}{\sigma^n} - B\right]}{\delta} \times 1000$$

- S = SOIL LEAD CONCENTRATION ppm
- T = TARGET Pb-B µg/dl
- G = GEOMETRIC STANDARD DEVIATION OF BLOOD LEAD DISTRIBUTION
- n = NUMBER OF STANDARD DEVIATIONS CORRESPONDING
- B = BACKGROUND OF BASELINE Pb-B - OTHER SOURCES
- δ = SLOPE OF Pb-B/Pb-S RELATIONSHIP µg Pb/dl PER 1000 ppm

The following table demonstrates how different target blood lead levels can be used in the model to determine acceptable soil lead levels.

TABLE I. *Use of Target Blood Lead and Percent of Population to be Protected to Determine Acceptable Soil Lead Levels.*

TARGET Pb B µg/dl	%POPULATION < Pb-B 50	95	99	99.9
10	3000	875	300	–
15	5500	1800	1500	700
20	8000	3750	2600	1600
25	10000	5200	3700	2500

δ = 2, B = 4, GSD = 1.4

TABLE II *shows the use of different slopes with a fixed blood lead target level in determining which soil lead levels will protect 99% of the target population.*

TABLE II. *Protection of 99% of the Target Population using a blood lead value of 15 µg/dl and changing the slope of the blood-lead; soil (dust) relationship.*

99% < TARGET Pb-B = 15 µg/dl

GSD = 1.4 δ	S	δ = 2	S
1	3000	1.3	2100
2	1500	1.4	1500
4	750	1.5	930
6	560	1.6	520
8	375	1.7	190
		1.8	

S = SOIL LEAD CONCENTRATION IN ppm

TheTask Force also discussed and further developed the "phased-action plan" or protocol for users to follow in determining remedial action for a particular problem site. Each decision in the decision making process requires scientific evaluation based on documentation.

FIGURE 2 - *Shows a preliminary sketch of the flow chart. The final report will contain a more detailed version of the chart.*

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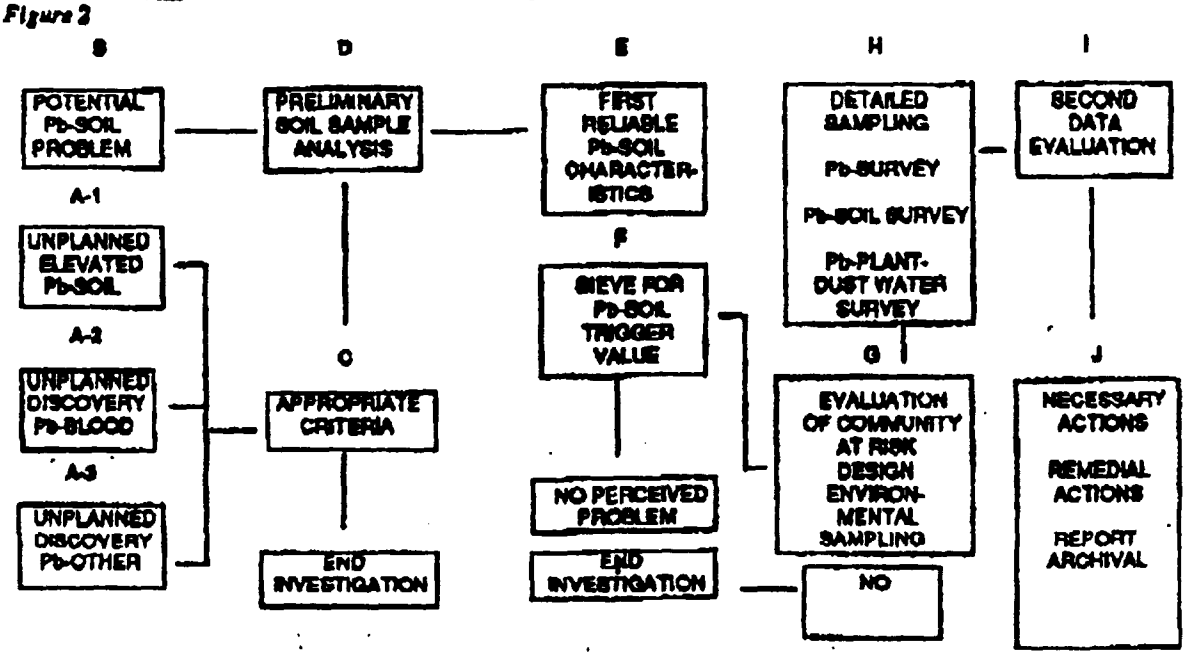
Figure 2



ISSUES AND GUIDELINES (cont.)

Both the model and the "phased-action plan" will be developed in the final report on lead in soil which will have the following format.

I. Introduction
II. Definitions
III. Phased-Action Plan - flow chart for decision making process
IV. Explanation - Decision Making
V. Appendices
   A. Procedure
   B. Resource Data
   C. References

The schedule for completing the report is as follows:

1. August 1989 Completion of the draft report to task force members for comment.
2. Late August 1989 Modifications and submission of the report to external review.
3. November 1989 Receipt of comments, revisions and changes in report.
4. December 1989 Request report approval by SEGH executive committee
5. January 1990 Submission of report/recommendations to EPA, other user groups.
   Publication of report by the SEGH journal *Environmental Geochemistry and Health*
   Publication of condensed report in other scientific journals.

Dr. William Farland, Director of Health and Environmental Assessment of EPA in Washington remains keenly interested in the Task Force findings and has asked Dr. Wixson to continue to brief him on the report's progress. Several representatives of the EPA, Robert Elias, Chris DeRoscn and Harlal Choudhury as well as Arwyn Davies from the British DOE attended the second Task Force meeting as observers and were reported by Dr. Wixson to be pleased with the protocol and matrix developed by the Task Force. Thus, Dr. Wixson appears to have successfully engaged the EPA's and DOE's involvement and support.

The final Task Force report will be submitted, if all goes well, to EPA and ILZRO by January 1990. Please note that the information and preliminary model and phased action plan may be slightly modified in the final report based on subsequent task force and public comments. Any comments on the model or the proposed phased-action plan from the readers are welcome and should be sent to the editor.

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Editorial

by Rosalind Volpe

Historically, industry has been concerned with creating and producing products and selling them at a profit to the customer. Up until the 60's and 70's, except for occasional and limited incidents, the general public was not aware of the potential harm industrial production could have on both the occupational worker and the environment as well as the consumer. Today industrial production and care and concern for the environment go hand in hand in a bond which becomes more and more complex from day to day.

In the late 1950's, when the International Lead Zinc Research Organization was in its beginning stages, its purpose was to create new ideas, new products and new markets for the lead, zinc and cadmium industries. In the 1960's when public awareness about the environment became acute and criticism towards industry increased, ILZRO took on another dimension, and began its environmental health program. Now, not only does ILZRO create new markets and products for the lead, zinc and cadmium industry, but it also examines the toxic properties of lead, zinc and cadmium and attempts to determine how best the industry should protect its workers, public health and the environment. This information base also serves to protect the industry against over zealous environmental regulations.

Since the 1960's, industry has been pictured as being concerned only about maximizing profit while caring little for its employees, its consumers or the environment. The environmental movement has resisted industry's attempts to improve its standing in the environmental arena and in fact, some extremists have even suggested the elimination of certain industries for the sake of the environment. Often this attitude has led to environmental regulations far more stringent than necessary. ILZRO's philosophy has been that industrial production and protection of the environment are both important for the future of society. Concern for both should go hand in hand and compromises should be made in order to balance both concerns. Without industry we have no wealth, without concern for environment we have no health. A balance is, therefore, essential.

There is a middle road in which both industry and the environment can exist without the destruction of either one. ILZRO recognizes that lead and cadmium can be toxic if used improperly. The budget for its environmental research program in the last five years looking into the toxic properties of these metals has grown from $350,000 to $1,200,000. This growth reflects the continuing challenges faced by our industry as well as the confidence of ILZRO's members in looking to ILZRO to meet its environmental research needs. Recognizing that maintaining a good rapport with regulators is vital, ILZRO has set up several joint conferences with the U.S. Environmental Protection Agency (EPA) in order to create forums for scientific discussions on important issues

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